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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,728	10/03/2005	Chandan Saha	61804A	5802
109	7590	12/11/2007		
The Dow Chemical Company Intellectual Property Section P.O. Box 1967 Midland, MI 48641-1967			EXAMINER PARVINI, PEGAH	
			ART UNIT 1793	PAPER NUMBER
			MAIL DATE 12/11/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/551,728	<b>Applicant(s)</b> SAHA ET AL.	
	<b>Examiner</b> Pegah Parvini	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 31-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6-11, 33 and 34 is/are allowed.
- 6) ☒ Claim(s) 1-5, 12-16, 31 and 32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |  |
|--|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. <u>20070914</u> |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____   |

### DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Rejections - 35 USC § 103***

2. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 2001/0038810 to Wallin et al. in view of US Patent No. 6,004,890 to Ueda et al.
3. Regarding claims 1-3 and 5, Wallin et al. teach porous ceramic grains which are substantially acicular in which an element such as Ce, Mg, Ca, iron, scandium, etc. may be incorporated into the lattice structure of the catalyst (paragraphs [0024], [0025], [0028], [0031], [0032]). Furthermore, Wallin et al. teach the use of precursor compounds such as clay, zeolites, alumina, silica, aluminum trifluoride, and fluorotopaz in the mixture when forming mullite porous catalyst support ([0045]). It is, further, noted that Wallin et al. disclose that in making such a porous catalyst support, precursor compounds are generally mixed, then shaped into a porous shape by any suitable method, and then is heated sufficiently to form the acicular ceramic grains of the support ([0043] to [0048]). In addition, Wallin et al. points to the fact that when the support is mullite, the precursor compounds contain Al, Si, and oxygen which are mixed to form a mixture capable of forming fluorotopaz and substantially mullite ([0043]). The mixture is heated under an atmosphere sufficient to form the porous catalyst support in

the presence of fluorine, which is provided through the  $\text{SiF}_4$  source ([0048]). Wallin et al., also, disclose that the metal elements are chemically bounded to the ceramic grains of the porous catalyst ([0037]). Additionally, Wallin et al. disclose that the acicular ceramic grains have a porosity of at least about 40 percent by volume ([0029]).

However, Wallin et al. do not expressly disclose a ratio of Al/Si of less than 3.1.

Ueda et al., drawn to heat-resisting material, disclose using alumina-based fibers which are preferably alumina-silica crystalline short fibers in which the alumina/silicon ratio (by weight) is 70/30 to 99/1 (column 3, lines 8-10, 28-34). If taking, for example, a ratio of 70/30, the value of 2.33 would result which falls within the claimed range.

Thus, it would have been obvious at the time of invention, to one of ordinary skill in the art to modify Wallin et al. which discloses the existence of both aluminum and silicon but do not expressly disclose a ratio of the two (Al/Si) within the claims range in order to have a ratio of less than 3.1, for example of about 2.56 as that taught by Ueda et al. motivated by the fact that the preferred ratio which is as a result of a preferred content of aluminum of 72 to 85 wt% imparts excellent high-temperature stability (column 3, lines 32-34).

4. Regarding claim 4, Wallin et al. disclose precursor compounds such as clay, zeolites, alumina, silica, aluminum trifluoride, fluorotopaz; preferably, clay, silica, alumina and mixture thereof; most preferably, the clay and alumina when forming a mullite porous catalyst support ([0045]).

5. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin et al. in view of US Patent No. 4,963,514 to Horiuchi et al.

6. Regarding claims 12 and 13, Wallin et al. teach porous ceramic grains which are substantially acicular in which an element such as Ce, Mg, Ca, iron, scandium, etc. may be incorporated into the lattice structure of the catalyst (paragraphs [0024], [0025], [0028], [0031], [0032]). Furthermore, Wallin et al. teach the use of precursor compounds such as clay, zeolites, alumina, silica, aluminum trifluoride, and fluorotopaz in the mixture when forming mullite porous catalyst support ([0045]). It is, further, noted that Wallin et al. disclose that in making such a porous catalyst support, precursor compounds are generally mixed, then shaped into a porous shape by any suitable method, and then is heated sufficiently to form the acicular ceramic grains of the support ([0043] to [0048]). In addition, Wallin et al. points to the fact that when the support is mullite, the precursor compounds contain Al, Si, and oxygen which are mixed to form a mixture capable of forming fluorotopaz and substantially mullite ([0043]). The mixture is heated under an atmosphere sufficient to form the porous catalyst support in the presence of fluorine, which is provided through the  $\text{SiF}_4$  source ([0048]). Wallin et al., also, disclose that the metal elements are chemically bounded to the ceramic grains of the porous catalyst ([0037]). Additionally, Wallin et al. disclose that the acicular ceramic grains have a porosity of at least about 40 percent by volume ([0029]).

Furthermore, Wallin et al., in an example, disclose the use of platinum oxide in a very small amount of 0.84 gram per liter ([0061]).

Although Wallin et al. do not expressly disclose any of the other disclosed property enhancing compounds ([0031]-[0032]) which are mostly claimed in the instant application, it would have been obvious to a person of ordinary skill in the art to have used a different property enhancing compound and/or a mixture of them motivated by the fact that Wallin et al. disclose a number of different metal catalysts ([0031]-[0032]); therefore, they have the same functionality. The fact that Wallin et al. has only used one of such metals in their example does not suggest that other metals, disclosed for the same purpose by the same reference, are not suitable. Furthermore, even though Wallin et al. do not expressly disclose "5% by volume" or "2% by volume", the reference discloses a very small portion of 0.84 gram per liter of the mixture during the process which would have had overlapping ranges of amount/volume with the volume instantly claimed; this is motivated by the fact that Horiuchi et al., drawn to ceramic compositions having very high properties which are formed as a result of shaping and heating a mixture of mullite powder and silicon dioxide, disclose that the amount of the sintering aid (which may be from Group IIA of the periodic table such as Mg or Ca) added to the ceramic mixture depends on the particle size distribution of the starting material powder and the kinds of compounds added and more (Horiuchi et al. column 2, lines 18-27, 65-67; column 3, lines 11-16; column 4, lines 38-47). Additionally, Wallin et al. disclose that the amount of catalyst used is enough for the particulate application ([0036]).

7. Claims 14-16, and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallin et al. in view of Horiuchi et al. as applied to claims 12 and 13 above and in further view of Ueda et al.

8. Regarding claims 14-16 and 31-32, the combination of references, Wallin et al. in view of Horiuchi et al., as discussed in details above, disclose a process of making a porous acicular mullite composition comprising of elements present in mullite and a property enhancing (or sintering aid) compound as discussed in details above.

The references as combined do not expressly disclose a ratio of Al/Si of less than 3.1.

Ueda et al. drawn to heat-resisting material, disclose using alumina-based fibers which are preferably alumina-silica crystalline short fibers in which the alumina/silicon ratio (by weight) is 70/30 to 99/1 (column 3, lines 8-10, 28-34). If taking, for example, a ratio of 70/30, the value of 2.33 would result which falls within the claimed ranges.

Thus, it would have been obvious at the time of invention, to one of ordinary skill in the art to modify Wallin et al. in view of Horiuchi et al. which disclose the existence of both aluminum and silicon but do not expressly disclose a ratio of the two (Al/Si) within the claims range in order to have a ratio of less than 3.1, or at most about 3.05 or 3.0 or 2.95 or at least about 2.2 as that taught by Ueda et al. motivated by the fact that the preferred ratio which is as a result of a content of aluminum of 70 to 99 wt% imparts

excellent high-temperature stability (Ueda et al. column 3, lines 32-34). Furthermore, they are from the same field of endeavor.

***Response to Amendment***

9. Applicants' amendments to claims 1-3, 5, 12-16 and 31, filed September 17, 2007, pages 2-6, are acknowledged. However, the amendments are not sufficient to overcome the rejection as set forth above.

10. Applicants' amendment to claim 11, filed September 17, 2007, pages 4-5, by incorporating the limitation of the base claim, based on previous set of claims, and intervening claims, is acknowledged. As such, the objection to said claim, as generally set forth in the previous Office Action, is hereby withdrawn.

11. Applicants' amendment to claim 6, filed September 17, 2007, page 3, by incorporating most of the limitations of claim 1 and 7, is acknowledged. With reference to Applicants' argument regarding the use of talc as a property enhancing compound in making the claimed mullite, said claim, claim 6 has been found allowable as set forth below. Thus, further amended dependent claims 7-10 have been found allowable. The rejection of said claims, as generally set forth in the previous Office Action, is hereby withdrawn.

***Response to Arguments***



12. Applicants' argument, see pages 7-8, filed September 17, 2007, with respect to Information Disclosure Statement has been fully considered and is persuasive. The objection to IDS has been withdrawn.

13. Applicants' arguments, see pages 10-11, filed September 17, 2007, with respect to talc being disclosed as a precursor of cordierite and not of mullite have been fully considered and are persuasive. The rejection of claim 7 has been withdrawn.

14. Applicant's arguments filed September 17, 2007, page 8, with respect to the Al/Si ratio has been fully considered but they are not persuasive.

Applicants have argued that Wallin et al. do not disclose a ratio of Al/Si of less than 3.1

The Examiner, respectfully, submits that in view of this amendment, a new rejection, as set forth in details above, has been made under 103(a) over Wallin et al. in view of Ueda et al.

15. Applicant's arguments filed September 17, 2007, page 9, with respect to a combination of catalyst elements have been fully considered but they are not persuasive.

Applicants have argued that Wallin et al. do not suggest such as combination.

The Examiner disagrees and, respectfully, submits that Wallin et al. disclose a series of different metal catalysts, and finally, the reference discloses that a "combination thereof" can be used. This appears to be clear enough to suggest a wide variety of embodiments for the disclosed invention. It is noted that Wallin et al. suggest such combination in paragraph [0032] after making the statement that "an element may be Ce, Zr, La, Mg, Ca, a metal element described in the previous paragraph or...", they add on "...combination thereof".

***Allowable Subject Matter***

16. Claims 6-11 and 33-34 are allowed.

The following is an examiner's statement of reasons for allowance: The prior art fail to suggest or disclose talc as the property enhancing compound used in making the claimed porous acicular mullite composition; furthermore, the prior art fail to suggest or disclose a ratio of Nd/Mg from about 0.1 to about 10 by weight in a porous acicular mullite. Additionally, although the prior art, as set forth in the previous Office Action, disclose a ratio of Fe/Mg of about 1.14 which is within the claimed range in the instant application, they fail to suggest or disclose that Fe and Mg are present as oxides.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pegah Parvini whose telephone number is 571-272-2639. The examiner can normally be reached on Monday to Friday 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on 571-272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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PP

  
**J.A. LORENGO**  
**SUPERVISORY PATENT EXAMINER**